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A case history concerning the planning and development of a junior college provides general guidelines, procedures, and information that may be applied to the planning and development of any new junior college. Consideration is given to the following topics--(1) site selection, (2) enrollment projections, (3) curriculum development for physical facility planning, (4) translation of curriculum into space requirements, and (5) translation of auxiliary and service needs into space requirements. (FS)

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PROVIDING PLANT AND FACILITIES AT CLEARWATER CAMPUS OF ST. PETERSBURG JUNIOR COLLEGE

For more years than I can remember, we in junior colleges have emphasized the *differing* characteristics of junior colleges, their *uniqueness,* and *individual* qualities. Such thinking has deeply impressed me through these years. It is, therefore, in some confusion that I discuss the planning and development of *one* junior college, which serves a specifically designated metropolitan community—a junior college that, moreover, is one campus of a multiple campus institution. From this case history, it is hoped that you may find general guidelines, procedures, and information that may be applied to the planning and development of any new junior college.

Since this is a "case" history, let me briefly give you some background material.

St. Petersburg Junior College, the oldest of the two-year institutions in Florida, moved 20 years ago from a "downtown" campus and one building to a campus located in the eastern part of the city, just a few blocks from the Gulf of Mexico. The campus contains 23 acres of land—and many people had shaken their heads over such extravagance. "What will the College ever do with all that land?" was a common question. Back in the 1930's, few people anticipated the current growth and development of junior colleges, and especially, St. Petersburg Junior College. Today the College enrolls between 5,000 and 6,000 students; the 23 acres are increasingly crowded with buildings (with practically no parking areas); and there is no lull in sight as enrollment increases.

Taking all these factors into consideration, the College Board decided not to attempt condemnation proceedings of high-priced residential property surrounding the campus, but to develop a multiple campus institution, with a second campus constructed at Clearwater, in the northern part of the county; to operate, not as a branch campus, but as one of two autonomous campuses under a centralized administration of the junior college. There would be, then, St. Petersburg Junior College with a St. Petersburg Campus, and a Clearwater Campus. Further enrollment projections indicate that there may even be a third or a fourth campus in the future. Each campus will enroll approximately 6,000 students by 1975.

In planning the physical facilities on the new campus, our general objective was to provide a superior and effective setting for teaching and learning. My presentation to you cannot be definitive—we do not have the time for this. Rather it will attempt to present some of the highlights of planning and some of the decisions that we made.

I.

SITE SELECTION

The selection of the site for a community junior college is among the most important decisions to be made. The site chosen will characterize and "flavor" the institution and its student body for as long as it is used for a college campus. The architectural motif of the buildings will be influenced by the site; the layout of the campus—the master plan—will be determined by the topography of the site and its relation to streets and entrances and exits; even student policy will be influenced by opportunities for recreation on the campus and the kind of landscaping suitable to it. Thus the wise selection of the place to establish the campus of a junior college cannot be overemphasized.

The size of the site should be based on plans for the ultimate enrollment of the college. Although site selection may very well occur before enrollment projections can be made, general estimates can be made simply from a knowledge of the population and possible growth of the area to be served by the junior college. If the college is in a growing metropolitan area, a safe assumption is that the college will ultimately be a large institution, enrolling 5,000 to 15,000 students or more; if the college is in an area of smaller, stable, or slowly growing communities, our assumption may be that it will ultimately enroll 1,000 to 5,000 students; if the college is in a rural area of small towns and villages, we may assume a college enrollment of 400 to 1,000 students. The comprehensiveness of the program and curriculum will affect the choice of a campus. Obviously, the more activities, programs, and curricula, the more space the junior college will need. It is suggested that a minimum size of 80 acres be secured for a small junior college campus; that a minimum of 150 acres be secured for a medium-size junior college; and that there be a minimum of 200 acres for a large junior college. More acreage is desirable in every instance. If you wonder what the land will be used for, it should be remembered that for a campus of 1,000 students, at least 10 acres will be needed for parking alone; on a campus of 5,000 students, 30 acres will be needed for parking areas and traffic lines; on a campus of 15,000 students, at least 80 acres should be reserved for parking areas and traffic lines—these figures may be conservative.

Frankly, few junior college administrators can ideally plan the size of their campus. In a metropolitan area, a large acreage is almost impossible to obtain. Many city junior colleges develop well-planned physical facilities and most effective programs on a small acreage. Even junior colleges in suburban or rural areas frequently cannot obtain the amount of land they would like to have. Careful planning, multiple-story buildings, careful layouts of recreation and athletic areas, and "inner" campus planning all aid in overcoming restrictions on space. At the Clearwater Center, with a projected ultimate enrollment of 5,000 students, we obtained 78 acres, and felt ourselves fortunate to get this much high-priced land. Space needed for parking always remains a problem, where acreage is restricted. Do we dare suggest multiple-level parking ramps?

The topography of the land is important in site selection. The land obtained must be a place to build buildings, put down streets and sidewalks,

and plan for attractive landscaping. A study of possible land utilization should be undertaken. There are beautiful campuses of ravines, streams, hills, and forests where actual land utilization is at a very low percentage. If such can be afforded by a junior college, it has my admiration. With only 78 acres obtainable for the Clearwater Campus, we had to make sure that we had almost 100 per cent land utilization.

The relation of the site to the community, to streets and highways, to powerlines and sewage lines is an important consideration. A site reached by streets through a semi-abandoned part of town, or through crowded industrial streets, or far from good access highways, or surrounded by unzoned, third-rate commercial property, is simply out of the question for a junior college campus.

Who are the ideal "neighbors" for a junior college campus? Most ideal would be a state or city park, landscaped and protected. Next in desirability would be residential areas supporting $20,000 to $50,000 homes; then in order, residential areas of less expensive homes, garden apartments, high-rise apartments. Satisfactory, but much less ideal are large shopping centers, professional building areas, mixed commercial and office areas. Least satisfactory, and to be avoided if at all possible, are airports, railway yards, filling stations, garages, factories, and drive-in restaurants and stands. Churches are very high on the list of desirable "neighbors" for college campuses, but unfortunately, churches rank educational institutions very low as "good neighbors."

The matter of land drainage is an important factor. Sites should be carefully studied in terms of drainage *after* construction, for many tracts of land apparently in their natural state properly drain, but when developed, do not. Extensive study of the *whole* problem before construction starts may save many a headache later.

The site finally selected for the Clearwater Campus contains 78 acres, is located one block from a through expressway, is on a main residential thoroughfare, is surrounded on two sides by residential area, and in addition has a church for a neighbor. We met a reasonable number of site selection requirements for our new campus.

II.

ENROLLMENT PROJECTIONS

Any study of enrollment projections for a community junior college should be used with caution; this is especially true of studies reflecting a fluid population, one that shows signs of spectacular and dynamic growth. Two main dangers confront those making the study: To use only known and provable factors, and thereby underestimate the junior college enrollment; or to place too much credence on the unknown (exponential) factors, and thereby use figures that will substantially overestimate college growth in enrollment.

Where does one start in making an enrollment projection? What are the steps involved in developing a projection of enrollment? The following procedure is recommended for a community junior college.

First, a projection of the general population of the area served by the community junior college is needed. What are the estimates of total population at given years? The sources for such figures are important in terms of reliability. Studies made by utility companies (light and power, telephone, gas,

water, etc.), by banks and finance corporations (savings and loan institutions are especially good), and by the area's major industries are usually well prepared, conservative, and reliable. After all, these companies or institutions are planning the expenditure of funds for future operation and capital outlay based on their figures, and they cannot afford a large margin of unreliability. A second source of studies may be less reliable, but is useful in validating or cross-checking other studies. This source includes chambers of commerce, boards of trade, state development or industrial commissions, and private industrial or commercial "newsletters." What generally do all these studies indicate? Is the population growing? How much? Of what age and sociological group will the population increase consist? Is there a leveling off, or a population plateau, in sight? What is the growth curve over the next ten years? Fifteen years?

Second, a projection of the school population in grades 1 through 12 is needed. The best and most reliable source for such information is, of course, the district or county school board office. How do the figures of school population relate to the figures of general population? Are the growth patterns consistent? What is the dropout rate between grades? Is it consistent or is it changing? Is there any foreseen change in the birthrate that could alter the figures in any year or sequence of years? At this point in the procedure, a reconciliation chart can be made, showing the general population estimates, the school population estimates, and their relationship and percentages.

Third, an estimate must be made of young adults, graduates of the high schools and others, who will be potential junior college students. The school board offices will be able to tell you how many high school students are now going on to college. This figure can be very misleading to a junior college official, however. How many more will attend college because of the establishment of a community junior college? Will any of those now going away to college attend junior college, thereby increasing the percentage of high school graduates entering the community institution? Unless you have previous figures available in an already established junior college which is planning expansion of its facilities or the addition of a new branch campus, it is advisable that you check with high school counseling staffs, and that you circulate a questionnaire among high school students. Such action will indicate in some measure the number of students who may attend the community junior college. From such figures, percentages can be calculated and applied to high school senior class enrollments for any year. The result will be a conservative estimate (students hesitate to indicate plans to attend a junior college if they believe they have any opportunity of attending a four-year institution). Such estimates may be substantiated by comparing them with similar percentages from junior colleges which are already established.

Fourth, certain exponential, or "unknown" factors, should be considered. There is the factor of high school graduates of some years who now enter junior college as freshmen. These students would not have appeared in earlier figures or estimates. How many are there? No one knows—but it is a factor. Another "unknown" is that group of students who, after their freshman year at a four-year college or university, stay home to attend a junior college. How many do this? Again, no one knows. Such exponential factors as the support, or lack of it, given the junior college by high school counselors, the geographic distance to the nearest four-year institution, and whether it

is public or private, the business situation and the amount of "ready money" in the area—whether or not it is a good "crop year" for farmers—all these will affect enrollment in any given year at the community junior college, but not one can be measured or calculated with accuracy or reliability. Even so, these factors must be considered.

Fifth, prepare a final projection of enrollment by years. It should be emphasized that even when the best sources are available, an enrollment projection, no matter how "educated" or "intellectual," is largely guesswork. Therefore, its validity and accuracy should be continually checked. Each year, revisions based upon actual figures should be made.

In making enrollment projections for the Clearwater Campus, we followed closely the above procedures. Of course, we first projected the enrollment through 1975 for St. Petersburg Junior College as a whole, then broke it down for each of the campuses. We now have had two years to re-evaluate our projections and validate the study. It is interesting to note that our projection the first year was within 20 students of the actual enrollment. A change in the state university's admission policy and a slight lull in business activities, making money "tighter," affected our second-year estimate; it was off by almost 300 students, or about 12 per cent. Because of this experience, we found it necessary to re-evaluate our enrollment projection each year, making such changes as new conditions dictated.

Our enrollment projections now indicate that the Clearwater Campus will open in 1964 with 1,200 students, will enroll 2,500 in 1967, and 4,800 in 1972. The St. Petersburg Campus will enroll 4,400 in 1967, 5,200 in 1969, and 6,100 in 1972. On this "population" basis we began planning our physical facilities.

III.

CURRICULUM DEVELOPMENT FOR PHYSICAL FACILITY PLANNING

Since we believe that planning for physical facilities at community junior colleges should be "program directed," it is necessary to consider the proposed program and curriculum of the institution early in the schedule. It is our opinion that all construction on a junior college campus should be the result of curriculum and program needs.

The curriculum and program of any community junior college is necessarily dictated by two forces: (*a*) the course requirements for receiving degrees at the four-year colleges and universities to which the majority of students will transfer, and (*b*) the expressed and known needs of the community served by the junior college. It is fairly easy to prepare a curriculum designed to meet transfer requirements—a perusal of the catalogues of the four-year colleges and universities or a visit to the deans and registrars of the institutions will provide the necessary information. But it is not easy to discover and wisely interpret the needs of a community. We are prone to base judgments on invalid external factors when deeper consideration should be given to other factors. A community junior college in a large farming area may suggest a need for an agriculture curriculum, only to find that this is not really a need of the people. Many a good junior college curriculum has been dashed to pieces against a rock of student indifference because the college interpreted its large number of co-eds as a real need for home economics programs.

Many fine texts and books have been written concerning the development of curricula in the junior colleges. It would be presumptuous and unnecessary for us to paraphrase these expositions here. However, in the interests of sound planning, we do believe that there are some general statements concerning curriculum that may be helpful.

1. A core general education curriculum should be developed first; and preprofessional curricula related to it, with electives in each field, should be given thorough study. For a growing institution, it is better to have "related" curricula than a series of separate and unrelated programs offering a diversity of courses.
2. Highly specialized "terminal" curricula should be slowly developed, after thorough and continuing study, and with consideration given to stable and continuing need and to costs.
3. Art and music offerings should be general at first, and the development of a complete curriculum delayed until needs are based upon something more than to "learn cartooning" or "take up painting as a hobby" or "sing in the glee club." When the needs of the students are expressed convincingly for a professional and academic approach to these areas, then curriculum development can really begin.
4. The list of subjects required by the college for graduation or completion of a program should be determined as soon as possible, for these decisions will have a direct influence on the physical plant. For instance, if political science is required of all students in the college, the demand for instructional space for political science will be much more than if political science is an elective course taken by comparatively few people. If graduation requirements are going to be different for some programs than for others, such differences must be defined and clearly explained, for such an arrangement will certainly affect enrollment in these courses and thus influence space demands.
5. Before facility planning is initiated, basic policy decisions must also be made concerning the administration of the physical education program and the intramural athletic program. What interscholastic sports will be sponsored by the college? What will be the basic intramural competitive sports? What recreational facilities will grow out of the physical education program that will be made available to all students or to the public?
6. As the curriculum is developed or expanded, careful preparation should be given to the writing of course descriptions. For purposes of planning facilities, detailed and complete course descriptions should be prepared, perhaps even more detailed than will eventually appear in the college catalogue. The facilities planning group will know just what kind of instructional area is needed, something of the type of equipment to go into it, and will even be able to make decisions concerning class size and schedule arrangements.
7. The relation of one instructional field to another and the interrelationships of all college activities to each other will set a pattern for future program and curriculum growth and development. Should languages be included among communications along with English and speech, or do they more properly belong in the humanities areas where we find relationships between art, music, philosophy, design, and drama? Is religion

a social science or a humanities course? There are curriculum relationships which are not as obvious or as clearly demonstrated as those mentioned. Is business writing, for instance, related more closely to communications than to the area of commerce and business? Is engineering drawing related to art as well as to mathematics, and in what degree? It is vitally important to determine what the curriculum relationships are going to be on a new junior college campus, for the kind of relationships may allow various disciplines to share or use similar instructional areas and will determine to a great extent what courses will be taught in what buildings, and even in what areas of the campus. Good campus planning and good facilities planning demand that decisions be made concerning such related arrangements before a campus master plan is drawn up or before detailed facility planning is undertaken.

In planning and developing the Clearwater Campus, we had an approach to curriculum different from that of most beginning junior colleges. Since we were to be one campus of a multiple-campus institution, we had a ready-made curriculum successfully in operation on the St. Petersburg Campus. However, it was decided early in the planning that while there would be close coordination and articulation between the two campuses in course offerings and programs, there would not be slavish duplication. Thus we followed the procedures for curriculum development very much as if we were to be an entirely separate and autonomous institution. This not only allowed us to assume a fresh viewpoint toward curriculum and program, but also encouraged the faculty on the St. Petersburg Campus to evaluate their current offerings and program in light of those being developed and planned for the Clearwater Campus.

IV.

TRANSLATION OF CURRICULUM INTO SPACE REQUIREMENTS

To translate a proposed instructional program into classrooms, laboratories, and complementary areas is a task that may be fraught with some perils. Certainly there are pitfalls for unwary planners as they proceed from the "wild blue yonder" of imaginative planning to the prosaic reality of square feet of floor space, wall arrangement, and building size. In every translation of curriculum to physical plant, judgments will be made and interpretations given that later experience will modify; but it is hoped these will not be numerous and that the over-all plan will provide for a very satisfactory learning and teaching environment.

In translating the curriculum into space needs, and in the attempt to achieve maximum facility usage, the first major problem encountered by those charged with this responsibility is the establishment of a basic core of information concerning the number and distribution of students, the number and distribution of faculty and supporting personnel, the distribution of students 10 and 15 years in the future, and the attrition rate of students. The source of this kind of information, of course, is the study of enrollment projections. However, it is time now to carry enrollment projections into a more detailed kind of study. Not only should we know the total enrollment at any

given time; but we should also try to estimate the number of students out of this enrollment who will register for certain courses. How many students will take freshman English or calculus or chemistry or biology or history? The distribution of students in various programs is important information. Certainly when we know how many students will enroll in freshman English, we will know then how many instructors in freshman English it will be necessary to employ. We not only determine, therefore, course enrollment—and by finding the optimum section size determine the number of rooms needed to teach any given subject—but we also resolve faculty distribution and department size. Such estimates, as described above, vary from institution to institution, depending upon whether a junior college is serving a rural area or a metropolitan area, and depending somewhat upon the character and make-up of the student body. For new junior colleges where there is no background of experience to use, it is suggested that the distribution of students in various courses at other junior colleges which are similar in environment and possible student body characteristics be used. The records of junior colleges with a background of enrollment experience will constitute the best source for such information. Information concerning the distribution of students into the courses of a curriculum should be taken from enrollment figures early in the first semester. Regardless of what happens in terms of dropouts or second-semester enrollments, facilities must be provided for the maximum enrollment. Student attrition between the first and second years must be carefully estimated so that some accuracy can be given to estimates of course distribution in the sophomore year. The distribution of students into courses 10 or 15 years in the future should be estimated in the same way and using the same rate of growth as will be found in the over-all enrollment projections.

There is a second major problem confronting those who have the responsibility for planning facilities; that is, the determination of the number of faculty contact hours with students, decisions regarding the optimum size of sections and the hours available for teaching in the college schedule, and the amount and kind of faculty office space required. The length of the college daily schedule is a very important factor in determining the number of specific facilities needed. It is obvious that an institution that plans a schedule between the hours of nine in the morning and four in the afternoon, five days a week, will demand much more space in the instructional area than an institution which will schedule classes from eight in the morning until five in the afternoon, five and a half days a week. The longer the daily schedule, the fewer sections that need be scheduled at any one time and, therefore, the fewer instructional spaces that are necessary.

The third major problem is the relation of all needs and projections to the financial structure and the economic aspects of the college.

In our study of junior college programs, and of the planning and developing now going on in many areas, we have reached conclusions that lead away from some previously accepted concepts. In our planning, for example, we very definitely regard the deliberately restricted classroom size (to insure small classes at all times on the junior college campus) as a luxury too expensive for the growing junior college to justify. Different teaching and learning procedures must be devised to serve effectively larger and larger numbers of young people. Many new teaching techniques have already been explored.

Today we are, for example, getting satisfactory results from such techniques as the large lecture section-small discussion group, closed circuit television in the classroom or lecture hall, the team teaching approach, the machine program concept of teaching, the instructor-directed project, and others. If new techniques of teaching are to be used, then classrooms and laboratories must be devised to make the most effective and satisfactory use of these methods.

Thus we have envisaged a teaching program composed of formal instruction to groups whose size will be determined by the kind of subject matter presented and the technique of instruction most conducive to superior achievement. Opportunity for continual, regular, and frequent academic conferences between students and instructors should be provided in an appropriate office or other conference room; the time for these scheduled meetings must be provided for on the schedules. Thus we have given emphasis to several types of classrooms and laboratories in our planning, and we have also given emphasis to the instructors' offices and conference suites. In our visits to junior college campuses in several sections of our nation, it has appeared to us, on occasion, that offices, work space, and conference rooms for the instructional staff have been rather casually planned and arranged for, almost as if architecturally leftover space has been allocated for this purpose. With an insistence upon the out-of-class work of the instructor and the increased preparation and research time demanded by the new techniques of instruction, sound architectural planning must be given to this area.

It cannot be too greatly emphasized that flexibility is the underlying "theme" of a good college building program. In the following discussion I shall tell you what "core" size of instructional space we planned for the Clearwater Campus, and what our maximum class or group size would be; but this is a part of the case history of planning for *one* school, and is not necessarily intended to be a recommendation for others to follow. Each institution should, through study of its program, procedures, and policies, be able to denote its own "core" space requirements and section sizes. There must be one controlling factor, however, in this kind of planning: All space should be so constructed that it may easily and inexpensively be expanded, decreased in size, or rearranged to meet changing needs and requirements. By flexibility, we do not mean, necessarily, the folding partition type of wall or enclosure. In some instances, flexibility may be achieved by using this kind of room divider; but it is my experience that there is considerable dissatisfaction among those who have used such partitioning for all general instruction areas. Cement block, or other construction material, used in nonload-bearing interior walls, which can be torn out to expand space or which can be modified by alteration, offers inexpensive flexibility and good insulation and soundproofing at the same time.

For instructional areas we are proposing four general space sizes: 700 net square feet to serve 24–40 students; 1,050 net square feet for 40–60 students and for all laboratories providing for at least 24 student stations; 1,500 net square feet for 80–100 students; 3,850 net square feet for 200–250 students. We are also proposing that language laboratories be not over 700 net square feet and be designed to provide for not more than 24 student stations. Observation and experience have indicated to us that the effectiveness of language laboratory devices and instructional techniques is decreased in proportion to the excess of student stations beyond 24. However, flexibility in

room design is strongly recommended so that future expansion of the language laboratory may easily be accomplished.

We have taken a long look at the food service areas for a junior college campus. In examining the plans of many community junior colleges, we have been somewhat startled to learn just how large an area must be provided for food service. The question was asked: If a college is to enroll students from a local community area, with no dormitories, and the campus is located in a metropolitan or town environment, why provide extensive and complete food service? A survey was made of a number of junior colleges to find out how many students ordered *complete* meals each day as compared with the number who ordered sandwiches, salads, soup, snack foods, and beverages. We found that only 10 to 20 per cent of the students in a commuting junior college ate complete hot meals. The remainder of the students ordered food from the snack bar or ordered light lunches. Since this is so, it is believed that a large and expensive food service area is not necessary, if good quality, variety, and service are offered through the snack counter area or through a variety of food vending machines. The savings of considerable money can thus be effected as well as a saving of floor space for food service.

From the beginning of community junior colleges, two campus areas have been available to students when they were not in classes. One is the student lounge, union, center, or by whatever name it goes. The other is the library. Too often the activities for which each is designed get confused—the blaring jukebox or the conversation and confusion of the student center offer no place for quiet meditation or study, while the research-study atmosphere of the library may offer little comfort to the person seeking a place for visiting and conversation. We believe that a third area is needed for commuting students on a junior college campus. This area should be close to instructional offices to facilitate at least semi-supervision; and it should provide a quiet place for either study, reading, or relaxation. The area should be furnished with study tables, comfortable chairs, and perhaps small round conference tables for four or six students. The space may be used for other small gatherings at carefully scheduled times. This area should not be an enclosed room but an alcove off an office suite or an extension or "bay" of a corridor or lobby. It should not be large and there should be several such areas on the campus.

We also believe that junior colleges in regions with mild temperatures are not taking full advantage of the possibilities of open-air areas, not only for physical education activities but also for instruction, recreation, relaxation, and even some types of study. We urge that in planning an attempt be made to utilize the *entire* campus in the program.

In developing the programs and the activities in a new junior college, different attitudes and policies concerning athletic programs should be considered. It should be recognized that there may be justification and real worth for some junior colleges to develop extensive intercollegiate athletic programs. In many junior colleges that we observed and studied, however, we found little apparent justification for the expensive demands of intercollegiate athletic programs. Such programs often require physical space and equipment, usually provided at the expense of good physical education instruction, the development of intramural activities, or the maintenance of good campus-wide recreation programs. If the junior college does not carry on an extended intercollegiate athletic program or if it supports

only one major sport in such a program, then certainly physical facilities should be related to such a program. Without the necessity for large areas devoted to spectator sports (including large areas for spectator seating), space can be designed more appropriately for the physical education and recreation requirements of the institution.

How should the kind of instructional space and the number of such instructional spaces be determined? The enrollment projection already made should be an invaluable aid to the campus planner at this point. The basic instructional space for a junior college campus is the standard classroom, seating a section composed of 25–40 students and containing 700 net square feet of floor space. Experience has indicated that the section size for most classes will be nearer 25 than 40, with an average of somewhere close to 30. Study, experience, and observation have also indicated that the average full-time student who has enrolled for 12 to 16 semester hours of work will spend 9 of these hours in a standard classroom. To determine the number of classrooms needed, multiply the total full-time enrollment by 9, which will then give a total number of semester hours of use in such classrooms for the entire full-time equivalent student body. However, since we will be able to seat an entire section in each classroom, it will be necessary now to determine the number of groups which these semester hours represent. The above figure may be divided by the minimum size of the sections. In order to decrease the number of classrooms to be constructed, some campus planners will set the minimum classroom size at 30 or 32. However, this is thought to be an error in that in actual practice the minimum size of sections will not be this large, and it is better to provide for classrooms on a more liberal estimate and, therefore, the minimum size of sections should be determined as not over 25 students per section. The figure obtained after dividing the total number of semester hours by the minimum size of a section will give us the number of meeting times necessary to provide for. If the college is operating on a schedule of 40 hours per week, from 8:00 a.m. to 4:00 p.m., thus providing for eight class hours per day, and giving us a total possible use of 40 class hours during a five-day week, we must again realize that total utilization is not possible. A conservative estimate based upon a national average is that the standard classroom will average about 60 per cent utilization per week. Certainly by careful scheduling and through the use of other factors a greater utilization can be realized; but in planning for facilities it is always better to plan in terms of the more established and more conservative estimates. Sixty per cent of 40 hours per week would give a possible use of a classroom of 24 hours per week. Twenty-four should then be divided into the number representing the number of standard classrooms necessary for any given enrollment size.

The following sample will illustrate the above procedure. (a) If we are providing for an initial enrollment of 500 full-time equivalent students and we use the estimate that each student will receive instruction in a standard-size classroom for 9 hours per week, we then multiply 9 times 500 and determine that 4,500 individual class contact hours must be provided for. (b) However, since students are not taught as individuals in a classroom all to themselves, but are taught in groups or sections, we then may reduce the number of class contact hours by dividing these hours by the minimum section size, or 25. We thus obtain the figure 180 which represents class contact hours for the

number of groups or sections needed. (c) We have determined that our daily class schedule will be an eight-period schedule, five days per week, or a total of 40 possible scheduled class hours per week. Realizing, however, that our classroom utilization will be only 60 per cent of this, we have a utilization figure of 24 hours per week that each classroom will be in use. We divide our 180 class contact hours for sections by 24 and determine that we will need 7½ standard classrooms for an enrollment of 500 students, and therefore in our planning we will provide initially for 8 classrooms with a net square footage of 700 each.

This same formula can be used to determine expansion needs as the student body grows. If we have determined that three years from now our student body will have grown from 500 full-time equivalent students to 800 full-time equivalent students, we can simply take the increase in growth, apply the same formula to it, and determine how many additional classrooms we will need in three years.

Present-day teaching techniques and the demand for flexibility in planning additional facilities initiate consideration for a larger size classroom designed to seat from 60 to 75 students. In these classrooms there may be an emphasis upon audio-visual presentations or the combining of smaller discussion sections into a lecture group, or such planning may provide the means of increasing the size of classes in certain disciplines where a large group does not at all detract from the effectiveness of instruction. Such classrooms should be planned with a minimum of 1,050 net square feet and the minimum section size should be considered at not less than 50. Experience has indicated that the number of these classrooms need not be great, for taking the full-time equivalent student enrollment as a whole, the average time spent by each student in such a classroom is only one hour. Thus it is easily seen that if the average is only one hour per student, then not too many students are scheduled for sections meeting in these large rooms. Again, by using the formula outlined for determining the number of standard classrooms and based upon an imaginary student enrollment of 500, and again at 60 per cent utilization of the room and using minimum section enrollment of 500, actually less than one room is needed. Therefore one such room would be planned in a campus designed for only 500 students.

With the increasing emphasis upon science subjects and the rising enrollments in science, special attention and consideration should be given to the planning of science facilities. In spite of protestations from some campus planners that multiple disciplines may use a general type of laboratory, it is our opinion, based on observation, experience, and conference, that the general type laboratory for junior college instruction is not the best plan. No matter how small the institution may be, basically there should be a chemistry laboratory, a biology laboratory, a botany laboratory, and a physics laboratory. These facilities are necessary even though they may not be utilized to their fullest extent for several years after construction.

It is our considered opinion that laboratories should have a minimum of 1,050 net square feet and that they should be designed for not more than 24 student stations. This size room will allow some extra space for work tables and small instruction groups away from the laboratory tables. For campus planners who are developing an initial facility for a rather large initial enrollment, again the formula for determining the number of instructional

areas to construct can be applied by considering that each full-time equivalent student will spend an average of three hours in a laboratory. This is the average for the entire student body. Thus, if the initial enrollment is 1,000, we apply our formula of 3 hours, times 1,000, or 3,000 hours, divided by the minimum section size which, as experience has shown in laboratories in junior colleges, will average only about 20 to a section (few laboratory sections, because of scheduling difficulties, will reach the maximum number of 24). Then by applying a utilization percentage of 80 per cent instead of 60 per cent used for classrooms, we find that four and a fraction laboratories are needed which, of course, will mean five laboratories. Since experience has also indicated that one physics laboratory is sufficient to serve a student body of 3,000 students, our distribution of laboratories would be one physics laboratory, two chemistry laboratories (one for general chemistry and one for the advanced chemistry subjects), and two biology laboratories. Just as there is a basic minimum of three laboratories no matter how small the junior college enrollment may be, so there is a reasonable upper limit; and again experience has shown that by careful scheduling and an emphasis upon greater utilization of the laboratories, six science laboratories, one physics, three chemistry, and two biology, will serve a full-time equivalent student enrollment of 4,000 students, and by adding another physics laboratory, a student full-time enrollment of 5,000 may be served.

To those who have doubted these figures, may we point out that in just the last few years, especially with the development of closed circuit television and the increasing use of visual aids, new courses in science have been developed which are nonlaboratory in nature and which employ the survey-type presentation. Many nonscience majors are enrolling in these courses to meet their general education requirements rather than enrolling in the more demanding laboratory courses in science. Thus we are finding growing enrollments in such courses as the biological sciences, as distinguished from biology or zoology or botany, and the physical sciences as distinguished from chemistry or physics or astronomy or geology. There is no longer the need, therefore, for as many laboratory areas as there once was.

A reference in the above paragraph to the development of new approaches and new techniques in teaching the various disciplines brings us to a consideration of the next kind of instructional space needed on the junior college campus. These areas may be called the special instructional areas, rooms designed for particular purposes and frequently containing highly specialized equipment. In the specialized instructional areas we would identify the language laboratory, or with its more general use, the electronically equipped laboratory; the special rooms for teaching business courses such as typing, business machines, and accounting; the music rooms, the space for chorus and band; the art and ceramics studio; the engineering drawing laboratory with its highly specialized tables designed primarily to teach large groups; the teaching auditorium for the science survey courses, the social sciences, and the humanities. Again the campus planner is faced with the problem of how many of these special instructional areas should be constructed on a junior college campus. Since these areas with their highly specialized needs are both expensive to construct and expensive to equip, economic considerations must play a great part. It should be understood that for a campus designed to provide a full complement of facilities, there probably should be a basic de-

mand for at least one instructional area for each of the special disciplines. That is, there would basically be one language laboratory or electronically equipped laboratory if it is to be used also in the teaching of shorthand, stenography, dictation, and music appreciation as well as languages; one art studio; one large combination band and choral room; one business laboratory equipped with combination typing tables and accounting tables with a work alcove for business machines; one engineering drawing laboratory, in which the drawing tables may also be used for work in art; a combination business-commercial laboratory in which all business subjects may be taught; a teaching auditorium with acoustically treated dividers or partitions so that two classrooms could be made of the teaching auditorium and thus multiple use of this area could be made; and a band and choral room with its tiered and curved platforms which would enable it to be used part-time as a lecture room or a large classroom. The only facility which does not lend itself well to uses not involving its highly specialized equipment is the language laboratory.

There is no very good or accurate method of deciding just how many specialized instructional areas are needed for full-time equivalent enrollments; and the campus planner, as he begins to examine the needs of a student body of 1,000 or 1,500 or 2,500 or 4,000 students, should make use of his course description chart which indicates the number of students generally enrolling in any given discipline based upon any given full-time equivalent enrollment. Generally speaking, for a full-time equivalent study body of 4,000 students, requirements will include three language laboratories, a large business-commercial suite of three rooms, several smaller instructional areas and at least 10 practice rooms, a large combination art and ceramics studio with plenty of storage space, two engineering drawing laboratories seating a minimum of 25 students each, and at least five teaching auditoriums, three of which would be designed to seat 100 students, and two designed to seat about 250 students.

V.

TRANSLATION OF AUXILIARY AND SERVICE NEEDS INTO SPACE REQUIREMENTS

From an academically philosophical point of view, several of the areas described in this section, such as faculty offices and the library, should be considered as a curriculum need, but for practical purposes in planning, they are being included in the service and auxiliary section.

Defining the need for faculty offices has brought about some differences of opinion on the part of campus planners and of administrators. The arrangements of offices, the number of faculty members occupying an office, and the size of faculty offices have all become points of controversy. Our description of needs for faculty office space is arbitrary, and is certainly open to discussion and modification. However, it is our intention to be somewhat dogmatic in our presentation of this part of the paper and to suggest that those who cannot subscribe to the kind of planning which we have presented make such adjustments and modifications in floor space and arrangement as seem suitable and satisfactory.

It should be emphasized that faculty office space on a junior college campus

is as much a necessity as classroom or laboratory space. The junior college faculty office is not an escape room for the faculty member, nor is it a place to while away time between classes. It is itself an instructional area, a place where faculty-student conferences are held, where instructional sessions may be scheduled with one or two persons, a center for the preparation of instructional presentations, and a place for grading, evaluating, and record keeping. It is a work room for faculty. Certainly it would be ideal if a sizeable room could be assigned to each junior college instructor for carrying on all these activities, but a realistic approach, from the point of view of space required and economic cost, demands that only reasonable space be allotted for this purpose. Many boards even today question the amount of space allotted for faculty offices, and sometimes suggestions are made that large common office areas should be constructed or that an unreasonable number of persons share the same office space. The junior college administrator should reject all such proposals. Never should a large common room containing a number of desks be assigned for this purpose or planned for this purpose, and while two faculty members may occupy an office without too serious loss of effectiveness, never should more than this number be assigned to any one space. It is our conviction that the one-person offices are desirable. They allow for freedom in scheduling conferences and in working with students.

The *minimum* area required by one faculty member in an office is 75 sq. ft. It is emphasized that this is a minimum square footage and that if the college can afford the extra space, 100 sq. ft. per faculty member is far better. Both these square footages will allow for satisfactory desk space, bookshelves, and space for one, two or three conference chairs, allowing for either individual conferences or for a very small group.

The offices of department and division chairmen should be very carefully planned and should be the focal point of departmental or division business. It is recommended that a division chairman's office be at least twice the size of a faculty member's office, thus allowing for conferences or meetings with larger groups of people and allowing for a greater display of the materials used in the department in its instructional program. A reception room and secretarial area, with a small work space for a mimeograph machine, and storage room should be a part of the chairman's suite. Another very important part of the chairman's suite would be a conference room. In this conference room, not only could departmental or division meetings be held, but the room could also be scheduled for group instruction by any of the faculty members. Such a conference room should contain at least 300 sq. ft. of space, and more if possible.

The administrative area may be as large and complex or as small and compact as the ultimate enrollment of the junior college will demand and as the administration feels is necessary. Certainly the administration area would contain the general administrative offices, the finance office area, the admissions and records area, and the student personnel services area with office suites and conference rooms for the counseling and guidance staff. The size and the number of administrative offices must be determined by the organization of the junior college and by the desires of the administration. Most junior colleges planned during the last 10 or 15 years have underestimated the amount of space needed in a growing institution for the finance office

and the admissions and records office. Both of these areas demand a great deal of storage space and work space. Even with the advent of microfilming, a great deal of storage and work space will be needed for all kinds of records. Ample fire and security vault storage should be provided for both the finance office and the admissions and records office. If microfilm equipment or IBM operation is planned or being considered for future use, ample work space for such equipment should be provided.

A suggestion for the arrangement of these areas is that student traffic flow may be planned in order that registration may be carried on in the administration building, at permanent counters and desks. Many institutions today move their entire registration operations to a fieldhouse or gymnasium. Careful and sensible planning of the administration building in terms of student traffic flow may very well allow all registration procedures to be carried on without having to move elsewhere.

The student personnel services area in the administration building should be planned around physical facilities for counseling and guidance. Special rooms for small group testing, several conference rooms, and a small vocational guidance and counseling library should be included.

Library areas, including seating, stack spaces, work areas, desk space, audio-visual and conference rooms, demand a minimum requirement of 25 sq. ft. per student seated in the library, which number of students is at least 25 per cent of those on campus at any one time.

A more realistic figure for determining the ultimate size of the library and provide for all needed space would be 35 sq. ft. per student seated in the library. Some campus planners find it difficult to estimate with any degree of accuracy the amount of space needed for the book and materials collection. In other words, how much stack space should be provided in a library? It is indeed difficult to compute the amount of space needed for library holdings with a set formula. Different libraries compute materials placed on library shelves in different ways. Methods of counting library holdings are not uniform. Some libraries do not count numerous unbound or unprocessed items. Some have numerous oversized volumes in such fields as music or fine arts.

About 28 years ago, Robert W. Henderson, of the New York Public Library, set forth a formula which has frequently been used and is frequently quoted. Mr. Henderson's formula provides for approximately 100 books per standard stack section, or 10 books per square foot of floor space. Further experimentation has indicated that his formula may be too conservative an estimate. There are some campus planners who have indicated that as many as 175 volumes can be stored in a standard stack section; or 20 per square foot. A good working average, however, seems to be a more conservative 125 volumes per standard stack section, or 12 per square foot. It should be remembered that a "filled" stack section is one in which there is always space left for future growth and future addition. In most modern college libraries, books are arranged on the shelves by subject and, therefore, space must be left for expansion. It should be realized, of course, that collections do not grow uniformly, that there will be some overcrowding in certain areas.

A national study has indicated that new institutions experience a library volume increase of 10 per cent per year. This percentage will also apply to rapidly expanding institutions. On the average, junior college libraries grow 7 per cent annually. Libraries in established colleges or universities grow 4.7

per cent per year. Libraries in small private colleges, both senior and junior, average about 4.3 per cent growth. A reasonably generous formula would provide 125 sq. ft. of floor space for each 12 sections. This ratio assumes ranges of shelves 18 inches deep with 36-inch aisles between them, plus adequate cross aisles.

The development of a student activity area on a junior college campus is related to the philosophy and procedures adopted by the college. For instance, the planning of the student union is related to the size of a cafeteria food service area. If the snack bar type of food service is planned and no large dining rooms or kitchens are needed, then the snack bar area lounge rooms and activity rooms can be combined. Some junior college planners now advocate that the food service area and the recreation area with game rooms, Ping-Pong tables, etc., be separated from the more quietly and orderly conducted lounge rooms, health clinic, student government and activity offices, and bookstore.

After examining several such installations, we find ourselves much impressed with this kind of separation. The two areas of the student union may be separated by a patio, by a covered walkway, by a landscaped terrace, or by a terrace furnished with outdoor furniture for lounging and resting. The separation of the two areas emphasizes to the students the two different characteristics of the areas and provides a psychological dividing line between the more boisterous, noisy, and littered food service and recreation area, and the more quiet and orderly lounge and creative activity area. How large or how extensive or how expensive such an area should be again depends upon local thinking and local planning. Some administrative philosophy will place great emphasis upon the student area, realizing that day students must be provided facilities on the campus for food and drink, for rest, for recreation, and services, just as boarding students are provided many of these services in dormitory areas. Other administrative thinking emphasizes that most of the money for construction should be spent on areas more directly oriented to teaching and learning and that the student area should be kept to a minimum. We have visited campuses exemplifying both philosophies and are very much inclined to believe that the larger and more wisely planned student area is important to all-round institutional effectiveness.

There are some junior colleges where physical education and athletic activity are so strongly emphasized that the needs of these areas are met before any other planning is done and the junior college becomes virtually a campus dominated by a large and finely equipped gymnasium or fieldhouse. Our own view is that the gymnasium or fieldhouse should not be the first building constructed, and should not be unduly emphasized on the master plan of the campus. We do believe, however, that physical education and intramural activities are very important.

Areas for these purposes should be carefully planned. Shower, locker, and dressing rooms for both men and women should be located in a facility that can be expanded and which can provide space for indoor activities during inclement weather. We would like to point out that it is not absolutely necessary that shower, locker, dressing, and auxiliary space for physical education be made a part of the gymnasium or fieldhouse building. We have visited many junior college campuses where these facilities were contained in a separate building joined to the gymnasium or fieldhouse by an enclosed

walkway or by some kind of a protected corridor. The size of a fieldhouse or gymnasium is determined largely by the uses that will be made of it. If spectator space is to be added to the gymnasium or fieldhouse, this must be considered in the planning.

Campus planners should not forget the maintenance building, which should have space for maintenance and custodial crews, for campus deliveries, for the garage, campus trucks and motor division, and for storage space. It should have easy access to delivery roads.

VI.

SOME ADDITIONAL PRINCIPLES FOR PLANNING JUNIOR COLLEGE FACILITIES

It may be helpful at this point to turn once again to general principles.

To plan and develop a new institution, or a new educational facility on an already established campus, is not to sit down with pencil poised and say, "Let's begin planning." There is much thinking and reading, and more reading. There is enthusiasm for a new architectural concept. There is much writing and much more talking. But finally, something takes shape—the first vague, shapeless outline of a new college campus or a new college building begins to emerge and to become real. Constructive, tangible planning is under way.

There are, we think, several guiding principles in planning that may help us in our thinking, that will open up new viewpoints for us to consider, or that may support us in our creative endeavors.

1. There is only one certainty in planning, and that certainty is *change*. Our only recourse is to plan in terms of flexibility to meet that change, rather than to predict exact needs at all times. Flexibility, however, is not an easy concept to understand, and much poor planning has been done in its name. Flexibility in planning is not the "universal" classroom, the sliding partition, the divided auditorium, the multi-purpose space, the pie-shaped building, or any other of a multitude of designs and devices calculated to house any and all programs, class sizes, or activities—although any one of these features may be one way of attaining a part of the flexibility we want. Flexibility is something much deeper, more philosophical, more intellectual than design, arrangement, or gadget. It has to do with program, teaching procedure, policies of scheduling, teaching aids and their uses, size of groups and classes, instructors' schedules, and functional hours on the campus. Out of a study of flexibility based upon these factors may very well come a need for new design, convertible space, folding partitions, and all the rest. Real flexibility must, however, start with a dynamic, progressive, forward-looking program and curriculum especially forged for today's youth, tomorrow's man or woman.
2. Planning must include definite provisions for expansion. No matter how large your buildings are now, no matter how completely you have planned your campus, they will all be inadequate by 1975.
3. All planners must be fully impressed with the fact that the junior college campus of tomorrow will be used full time, day and night, summer

and winter, stormy weather and sunshine, and that it will be used by all ages of people and all levels of sophistication. Sound planning must recognize these facts.

4. The planner must always be aware of the problem of staff, the numbers to be used and the availability of money sufficient to hire them. Planning must be done so that the facilities will make it easy to make full use of total staff so that the work may be satisfactorily and efficiently done.
5. The failure of the modern age to develop taste comes partly from aesthetic impoverishment in the classroom. The fundamental problem is to translate feeling, in terms of values, into physical objects and activities. Psychological values and physical surroundings must be brought into a state of compatibility.
6. The architectural design should be such as to say frankly, "This is a college." Too many colleges look like factories. They have plenty of light and air, there is some clever geometry of design, but they don't say, "This is a college, a seat of learning, a place of intellectual achievement."
7. Sensible facility planning can come only after serious and wise consideration has been given to scheduling classes, lectures, and laboratories all through the day, the afternoon as well as the morning. To schedule classes, lectures or laboratories on the theory that students are more alert in the morning, and that no satisfactory learning or work takes place after lunch or in mid-afternoon is following an unfounded and unsupported superstition. Such scheduling does not support economical facility planning.
8. Planning and developing the physical facilities should take into consideration new materials and new methods of construction.
9. In the place of the buildings on a campus, we urge that space not be squandered by providing sweeping campus vistas or expensive building set-backs so that passers-by on the street or highway will have a "pretty picture." The orientation of buildings and areas should be inward, toward campus life, not outward. We also hope that the campus plan will not emphasize scattering buildings too thinly about a large acreage with too much space between buildings. This is the "cattle pasture" approach to planning. There is a psychological factor of advantage found in buildings planned fairly close to each other—not huddled, but adjacent.
10. Academic buildings should be placed in accordance with the interrelationship of academic departments. This should be done on the basis of student and faculty schedules rather than on any philosophical or intellectual kinship of disciplines.
11. The type of space most frequently slighted in planning is the faculty office. If one includes administrative and business offices, faculty offices, clerical offices, and miscellaneous desk space, this area comprises one-fourth of the total space on a junior college campus.
12. To work toward a high degree of space utilization as an end in itself may be destructive to the entire program of a college. Complete and total utilization of space during the college day is impossible in a well-rounded program. While attempts should be made to increase efficiency and use, the quality and type of educational program, the purpose for which space exists in the first place, must be the primary consideration in determining use.

I hope that what I have presented has been provocative. I hope that it has also been helpful and interesting. We do not believe for one minute that we have planned a model junior college campus at Clearwater, or even a spectacular campus; but we do believe that we have provided wisely and well for an effective instructional program.